1600

RAW SEQUENCE LISTING   DATE: 03/13/2003
PATENT APPLICATION: **US/10/035,060C**   TIME: 14:19:22

Input Set : **A:\PTO.VSK.txt**
Output Set: **N:\CRF4\03132003\J035060C.raw**

```
 3 <110> APPLICANT: Edwards, David L.
 4         Hernstadt, Corinna
 5         Wilcox, Edward R.
 6         Wong, Siu-Yin
 8 <120> TITLE OF INVENTION: Process for Altering the Host Range of Bacillus
thuringiensis Toxins, and
 9         Novel Toxins Produced Thereby
11 <130> FILE REFERENCE: M12C1FDF3D2
13 <140> CURRENT APPLICATION NUMBER: US 10/035,060C
14 <141> CURRENT FILING DATE: 2001-12-27
16 <150> PRIOR APPLICATION NUMBER: US 09/405,788
17 <151> PRIOR FILING DATE: 1999-09-27
19 <150> PRIOR APPLICATION NUMBER: US 08/855,160
20 <151> PRIOR FILING DATE: 1997-05-13
22 <150> PRIOR APPLICATION NUMBER: US 08/580,781
23 <151> PRIOR FILING DATE: 1995-12-29
25 <150> PRIOR APPLICATION NUMBER: US 08/420,615
26 <151> PRIOR FILING DATE: 1995-04-10
28 <150> PRIOR APPLICATION NUMBER: US 08/097,808
29 <151> PRIOR FILING DATE: 1993-07-27
31 <150> PRIOR APPLICATION NUMBER: US 07/980,128
32 <151> PRIOR FILING DATE: 1992-11-23
34 <150> PRIOR APPLICATION NUMBER: US 07/803,920
35 <151> PRIOR FILING DATE: 1991-12-06
37 <150> PRIOR APPLICATION NUMBER: US 07/356,599
38 <151> PRIOR FILING DATE: 1989-05-24
40 <150> PRIOR APPLICATION NUMBER: US 06/904,572
41 <151> PRIOR FILING DATE: 1986-09-05
43 <150> PRIOR APPLICATION NUMBER: US 06/808,129
44 <151> PRIOR FILING DATE: 1985-12-12
46 <160> NUMBER OF SEQ ID NOS: 9
48 <170> SOFTWARE: PatentIn version 3.1
50 <210> SEQ ID NO: 1
51 <211> LENGTH: 3531
52 <212> TYPE: DNA
53 <213> ORGANISM: Bacillus thuringiensis
55 <400> SEQUENCE: 1
56 atggataaca atccgaacat caatgaatgc attccttata attgtttaag taaccctgaa      60
58 gtagaagtat taggtggaga aagaatagaa actggttaca ccccaatcga tatttccttg     120
60 tcgctaacgc aatttctttt gagtgaattt gttcccggtg ctggatttgt gttaggacta     180
62 gttgatataa tatggggaat ttttggtccc tctcaatggg acgcatttct tgtacaaatt     240
64 gaacagttaa ttaaccaaag aatagaagaa ttcgctagga·accaagccat ttctagatta     300
66 gaaggactaa gcaatcttta tcaaatttac gcagaatctt ttagagagtg ggaagcagat     360
68 cctactaatc cagcattaag agaagagatg cgtattcaat tcaatgacat gaacagtgcc     420
```

RAW SEQUENCE LISTING   DATE: 03/13/2003
PATENT APPLICATION: **US/10/035,060C**   TIME: 14:19:22

Input Set : **A:\PTO.VSK.txt**
Output Set: **N:\CRF4\03132003\J035060C.raw**

```
 70 cttacaaccg ctattcctct ttttgcagtt caaaattatc aagttcctct tttatcagta   480
 72 tatgttcaag ctgcaaattt acatttatca gttttgagag atgtttcagt gtttggacaa   540
 74 aggtgggggat ttgatgccgc gactatcaat agtcgttata atgatttaac taggcttatt   600
 76 ggcaactata cagattatgc tgtacgctgg tacaatacgg gattagaacg tgtatgggga   660
 78 ccggattcta gagattgggt aaggtataat caatttagaa gagaattaac actaactgta   720
 80 ttagatatcg ttgctctgtt cccgaattat gatagtagaa gatatccaat tcgaacagtt   780
 82 tcccaattaa caagagaaat ttatacaaac ccagtattag aaaattttga tggtagtttt   840
 84 cgaggctcgg ctcagggcat agaaagaagt attaggagtc cacatttgat ggatatactt   900
 86 aacagtataa ccatctatac ggatgctcat aggggttatt attattggtc agggcatcaa   960
 88 ataatggctt ctcctgtagg gttttcgggg ccagaattca cttttccgct atatggaact  1020
 90 atgggaaatg cagctccaca acaacgtatt gttgctcaac taggtcaggg cgtgtataga  1080
 92 acattatcgt ccactttata tagaagacct tttaatatag ggataaataa tcaacaacta  1140
 94 tctgttcttg acgggacaga atttgcttat ggaacctcct caaatttgcc atccgctgta  1200
 96 tacagaaaaa gcggaacggt agattcgctg gatgaaatac cgccacagaa taacaacgtg  1260
 98 ccacctaggc aaggatttag tcatcgatta agccatgttt caatgtttcg ttcaggcttt  1320
100 agtaatagta gtgtaagtat aataagagct ccaacgtttt cttggcagca tcgcagtgct  1380
102 gaatttaata atataattcc ttcatcacaa attacacaaa tacctttaac aaaatctact  1440
104 aatcttggct ctggaacttc tgtcgttaaa ggaccaggat ttacaggagg agatattctt  1500
106 cgaagaactt cacctggcca gatttcaacc ttaagagtaa atattactgc accattatca  1560
108 caaagatatc gggtaagaat tcgctacgct tctactacaa atttacaatt ccatacatca  1620
110 attgacggaa gacctattaa tcagggtaat ttttcagcaa ctatgagtag tgggagtaat  1680
112 ttacagtccg gaagctttag gactgtaggt tttactactc cgtttaactt ttcaaatgga  1740
114 tcaagtgtat ttacgttaag tgctcatgtc ttcaattcag gcaatgaagt ttatatagat  1800
116 cgaattgaat ttgttccggc agaagtaacc tttgaggcag aatatgattt agaaagagca  1860
118 caaaaggcgg tgaatgagct gtttacttct tccaatcaaa tcgggttaaa aacagatgtg  1920
120 acggattatc atattgatca agtatccaat ttagttgagt gtttatcaga tgaattttgt  1980
122 ctggatgaaa aacaagaatt gtccgagaaa gtcaaacatg cgaagcgact tagtgatgag  2040
124 cggaatttac ttcaagatcc aaacttcaga gggatcaata gacaactaga ccgtggctgg  2100
126 agaggaagta cggatattac catccaagga ggcgatgacg tattcaaaga gaattacgtt  2160
128 acgctattgg gtacctttga tgagtgctat ccaacgtatt tatatcaaaa aatagatgag  2220
130 tcgaaattaa aagcctatac ccgttatcaa ttaagagggt atatcgaaga tagtcaagac  2280
132 ttagaaatct atttaattcg ctacaatgca aaacatgaaa cagtaaatgt gccaggtacg  2340
134 ggttccttat ggccgctttc agcccaaagt ccaatcggaa agtgtggaga gccgaatcga  2400
136 tgcgcgccac accttgaatg gaatcctgac ttagattgtt cgtgtaggga tggagaaaag  2460
138 tgtgcccatc attcgcatca tttctcctta gacattgatg taggatgtac agacttaaat  2520
140 gaggacctag gtgtatgggt gatctttaag attaagacgc aagatgggca cgcaagacta  2580
142 gggaatctag agtttctcga agagaaacca ttagtaggag aagcgctagc tcgtgtgaaa  2640
144 agagcggaga aaaatggag agacaaacgt gaaaaattgg aatgggaaac aaatatcgtt  2700
146 tataaagagg caaaagaatc tgtagatgct ttatttgtaa actctcaata tgatcaatta  2760
148 caagcggata cgaatattgc catgattcat gcggcagata aacgtgttca tagcattcga  2820
150 gaagcttatc tgcctgagct gtctgtgatt ccgggtgtca atgcggctat ttttgaagaa  2880
152 ttagaagggc gtattttcac tgcattctcc ctatatgatg cgagaaatgt cattaaaaat  2940
154 ggtgattta ataatggctt atcctgctgg aacgtgaaag gcatgtaga gtgtagaagaa  3000
156 caaaacaacc aacgttcggt ccttgttctt ccggaatggg aagcagaagt gtcacaagaa  3060
158 gttcgtgtct gtccgggtcg tggctatatc cttcgtgtca cagcgtacaa ggagggatat  3120
160 ggagaaggtt gcgtaaccat tcatgagatc gagaacaata cagacgaact ggagtttagc  3180
162 aactgcgtag aagaggaaat ctatccaaat aacacggtaa cgtgtaatga ttatactgta  3240
164 aatcaagaag aatacggagg tgcgtacact tctcgtaatc gaggatataa cgaagctcct  3300
166 tccgtaccag ctgattatgc gtcagtctat gaagaaaaat cgtatacaga tggacgaaga  3360
```

RAW SEQUENCE LISTING   DATE: 03/13/2003
PATENT APPLICATION: US/10/035,060C   TIME: 14:19:22

Input Set : A:\PTO.VSK.txt
Output Set: N:\CRF4\03132003\J035060C.raw

```
168 gagaatcctt gtgaatttaa cagagggtat agggattaca cgccactacc agttggttat 3420
170 gtgacaaaag aattagaata cttcccagaa accgataagg tatggattga gattggagaa 3480
172 acggaaggaa catttatcgt ggacagcgtg gaattactcc ttatggagga a           3531
175 <210> SEQ ID NO: 2
176 <211> LENGTH: 1177
177 <212> TYPE: PRT
178 <213> ORGANISM: Bacillus thuringiensis
180 <400> SEQUENCE: 2
182 Met Asp Asn Asn Pro Asn Ile Asn Glu Cys Ile Pro Tyr Asn Cys Leu
183 1               5                   10                  15
186 Ser Asn Pro Glu Val Glu Val Leu Gly Gly Glu Arg Ile Glu Thr Gly
187             20                  25                  30
190 Tyr Thr Pro Ile Asp Ile Ser Leu Ser Leu Thr Gln Phe Leu Leu Ser
191         35                  40                  45
194 Glu Phe Val Pro Gly Ala Gly Phe Val Leu Gly Leu Val Asp Ile Ile
195     50                  55                  60
198 Trp Gly Ile Phe Gly Pro Ser Gln Trp Asp Ala Phe Leu Val Gln Ile
199 65                  70                  75                  80
202 Glu Gln Leu Ile Asn Gln Arg Ile Glu Glu Phe Ala Arg Asn Gln Ala
203             85                  90                  95
206 Ile Ser Arg Leu Glu Gly Leu Ser Asn Leu Tyr Gln Ile Tyr Ala Glu
207             100                 105                 110
210 Ser Phe Arg Glu Trp Glu Ala Asp Pro Thr Asn Pro Ala Leu Arg Glu
211         115                 120                 125
214 Glu Met Arg Ile Gln Phe Asn Asp Met Asn Ser Ala Leu Thr Thr Ala
215     130                 135                 140
218 Ile Pro Leu Phe Ala Val Gln Asn Tyr Gln Val Pro Leu Leu Ser Val
219 145                 150                 155                 160
222 Tyr Val Gln Ala Ala Asn Leu His Leu Ser Val Leu Arg Asp Val Ser
223             165                 170                 175
226 Val Phe Gly Gln Arg Trp Gly Phe Asp Ala Ala Thr Ile Asn Ser Arg
227             180                 185                 190
230 Tyr Asn Asp Leu Thr Arg Leu Ile Gly Asn Tyr Thr Asp Tyr Ala Val
231         195                 200                 205
234 Arg Trp Tyr Asn Thr Gly Leu Glu Arg Val Trp Gly Pro Asp Ser Arg
235     210                 215                 220
238 Asp Trp Val Arg Tyr Asn Gln Phe Arg Arg Glu Leu Thr Leu Thr Val
239 225                 230                 235                 240
242 Leu Asp Ile Val Ala Leu Phe Pro Asn Tyr Asp Ser Arg Arg Tyr Pro
243             245                 250                 255
246 Ile Arg Thr Val Ser Gln Leu Thr Arg Glu Ile Tyr Thr Asn Pro Val
247         260                 265                 270
250 Leu Glu Asn Phe Asp Gly Ser Phe Arg Gly Ser Ala Gln Gly Ile Glu
251         275                 280                 285
254 Arg Ser Ile Arg Ser Pro His Leu Met Asp Ile Leu Asn Ser Ile Thr
255     290                 295                 300
258 Ile Tyr Thr Asp Ala His Arg Gly Tyr Tyr Tyr Trp Ser Gly His Gln
259 305                 310                 315                 320
262 Ile Met Ala Ser Pro Val Gly Phe Ser Gly Pro Glu Phe Thr Phe Pro
```

RAW SEQUENCE LISTING   DATE: 03/13/2003
PATENT APPLICATION: US/10/035,060C   TIME: 14:19:22

Input Set : A:\PTO.VSK.txt
Output Set: N:\CRF4\03132003\J035060C.raw

```
263                     325             330             335
266 Leu Tyr Gly Thr Met Gly Asn Ala Ala Pro Gln Gln Arg Ile Val Ala
267             340     ·       345             350
270 Gln Leu Gly Gln Gly Val Tyr Arg Thr Leu Ser Ser Thr Leu Tyr Arg
271             355             360             365
274 Arg Pro Phe Asn Ile Gly Ile Asn Asn Gln Gln Leu Ser Val Leu Asp
275     370             375             380
278 Gly Thr Glu Phe Ala Tyr Gly Thr Ser Ser Asn Leu Pro Ser Ala Val
279 385             390             395             400
282 Tyr Arg Lys Ser Gly Thr Val Asp Ser Leu Asp Glu Ile Pro Pro Gln
283             405             410             415
286 Asn Asn Asn Val Pro Pro Arg Gln Gly Phe Ser His Arg Leu Ser His
287             420             425             430
290 Val Ser Met Phe Arg Ser Gly Phe Ser Asn Ser Ser Val Ser Ile Ile
291         435     ·       440             445
294 Arg Ala Pro Thr Phe Ser Trp Gln His Arg Ser Ala Glu Phe Asn Asn
295     450             455             460
298 Ile Ile Pro Ser Ser Gln Ile Thr Gln Ile Pro Leu Thr Lys Ser Thr
299 465             470             475             480
302 Asn Leu Gly Ser Gly Thr Ser Val Val Lys Gly Pro Gly Phe Thr Gly
303             485             490             495
306 Gly Asp Ile Leu Arg Arg Thr Ser Pro Gly Gln Ile Ser Thr Leu Arg
307             500             505             510
310 Val Asn Ile Thr Ala Pro Leu Ser Gln Arg Tyr Arg Val Arg Ile Arg
311         515             520             525
314 Tyr Ala Ser Thr Thr Asn Leu Gln Phe His Thr Ser Ile Asp Gly Arg
315     530             535             540
318 Pro Ile Asn Gln Gly Asn Phe Ser Ala Thr Met Ser Ser Gly Ser Asn
319 545             550             555             560
322 Leu Gln Ser Gly Ser Phe Arg Thr Val Gly Phe Thr Thr Pro Phe Asn
323             565             570             575
326 Phe Ser Asn Gly Ser Ser Val Phe Thr Leu Ser Ala His Val Phe Asn
327             580             585             590
330 Ser Gly Asn Glu Val Tyr Ile Asp Arg Ile Glu Phe Val Pro Ala Glu
331             595             600             605
334 Val Thr Phe Glu Ala Glu Tyr Asp Leu Glu Arg Ala Gln Lys Ala Val
335     610             615             620
338 Asn Glu Leu Phe Thr Ser Ser Asn Gln Ile Gly Leu Lys Thr Asp Val
339 625             630             635             640
342 Thr Asp Tyr His Ile Asp Gln Val Ser Asn Leu Val Glu Cys Leu Ser
343             645             650             655
346 Asp Glu Phe Cys Leu Asp Glu Lys Gln Glu Leu Ser Glu Lys Val Lys
347             660             665             670
350 His Ala Lys Arg Leu Ser Asp Glu Arg Asn Leu Leu Gln Asp Pro Asn
351         675             680             685
354 Phe Arg Gly Ile Asn Arg Gln Leu Asp Arg Gly Trp Arg Gly Ser Thr
355     690             695             700
358 Asp Ile Thr Ile Gln Gly Gly Asp Asp Val Phe Lys Glu Asn Tyr Val
359 705             710             715             720
```

. . . ꞏ

```
362 Thr Leu Leu Gly Thr Phe Asp Glu Cys Tyr Pro Thr Tyr Leu Tyr Gln
363             725             730             735
366 Lys Ile Asp Glu Ser Lys Leu Lys Ala Tyr Thr Arg Tyr Gln Leu Arg
367             740             745             750
370 Gly Tyr Ile Glu Asp Ser Gln Asp Leu Glu Ile Tyr Leu Ile Arg Tyr
371         755             760             765
374 Asn Ala Lys His Glu Thr Val Asn Val Pro Gly Thr Gly Ser Leu Trp
375     770             775             780
378 Pro Leu Ser Ala Gln Ser Pro Ile Gly Lys Cys Gly Glu Pro Asn Arg
379 785             790             795             800
382 Cys Ala Pro His Leu Glu Trp Asn Pro Asp Leu Asp Cys Ser Cys Arg
383             805             810             815
386 Asp Gly Glu Lys Cys Ala His His Ser His His Phe Ser Leu Asp Ile
387         820             825             830
390 Asp Val Gly Cys Thr Asp Leu Asn Glu Asp Leu Gly Val Trp Val Ile
391         835             840             845
394 Phe Lys Ile Lys Thr Gln Asp Gly His Ala Arg Leu Gly Asn Leu Glu
395     850             855             860
398 Phe Leu Glu Glu Lys Pro Leu Val Gly Glu Ala Leu Ala Arg Val Lys
399 865             870             875             880
402 Arg Ala Glu Lys Lys Trp Arg Asp Lys Arg Glu Lys Leu Glu Trp Glu
403             885             890             895
406 Thr Asn Ile Val Tyr Lys Glu Ala Lys Glu Ser Val Asp Ala Leu Phe
407         900             905             910
410 Val Asn Ser Gln Tyr Asp Gln Leu Gln Ala Asp Thr Asn Ile Ala Met
411         915             920             925
414 Ile His Ala Ala Asp Lys Arg Val His Ser Ile Arg Glu Ala Tyr Leu
415     930             935             940
418 Pro Glu Leu Ser Val Ile Pro Gly Val Asn Ala Ala Ile Phe Glu Glu
419 945             950             955             960
422 Leu Glu Gly Arg Ile Phe Thr Ala Phe Ser Leu Tyr Asp Ala Arg Asn
423             965             970             975
426 Val Ile Lys Asn Gly Asp Phe Asn Asn Gly Leu Ser Cys Trp Asn Val
427         980             985             990
430 Lys Gly His Val Asp Val Glu Glu  Gln Asn Asn Gln Arg  Ser Val Leu
431         995             1000            1005
434 Val Leu  Pro Glu Trp Glu Ala  Glu Val Ser Gln Glu  Val Arg Val
435     1010            1015            1020
438 Cys Pro  Gly Arg Gly Tyr Ile  Leu Arg Val Thr Ala  Tyr Lys Glu
439     1025            1030            1035
442 Gly Tyr  Gly Glu Gly Cys Val  Thr Ile His Glu Ile  Glu Asn Asn
443     1040            1045            1050
446 Thr Asp  Glu Leu Lys Phe Ser  Asn Cys Val Glu Glu  Glu Ile Tyr
447     1055            1060            1065
450 Pro Asn  Asn Thr Val Thr Cys  Asn Asp Tyr Thr Val  Asn Gln Glu
451     1070            1075            1080
454 Glu Tyr  Gly Gly Ala Tyr Thr  Ser Arg Asn Arg Gly  Tyr Asn Glu
455     1085            1090            1095
458 Ala Pro  Ser Val Pro Ala Asp  Tyr Ala Ser Val Tyr  Glu Glu Lys
```

VERIFICATION SUMMARY   DATE: 03/13/2003
PATENT APPLICATION: **US/10/035,060C**   TIME: 14:19:23

Input Set : **A:\PTO.VSK.txt**
Output Set: **N:\CRF4\03132003\J035060C.raw**